

a semiconductor layer for forming a storage capacitor in the pixel portion, and phosphorus (P) is added to this region at the same concentration. (Fig. 10A)

The mask layer 208 is removed next by a substance such as hydrofluoric acid, and a step of activating the impurity elements added at the steps illustrated in Fig. 9D and Fig. 10A is performed. The activation can be performed by thermal annealing for 1 to 4 hours at between 500 and 600°C in nitrogen atmosphere, or by laser annealing. Further, both methods may be performed together. Laser activation is used in this embodiment, and KrF excimer laser light (wavelength 248 nm) formed into a linear shape beam is used, with an oscillation frequency of 5 to 50 Hz and the energy density set to between 100 and 500 mJ/cm², and this is scanned with an overlap ratio for the linear shape beam of 80 to 98%, processing the entire surface of the substrate on which the island-like semiconductor layers are formed. Note that there are no specific limitation placed on the laser light irradiation conditions, and that the operator may set them suitably.

A gate insulating film 220 is then formed with a thickness of 40 to 150 nm by using plasma CVD. A multi-chamber separation type plasma CVD apparatus is used here, and plasma cleaning is performed on the substrate on which the island-like semiconductor layers are formed in the same reaction chamber as that in which a gate insulating film is formed, or within a reaction chamber dedicated to plasma cleaning, before deposition of the gate insulating film. The plasma cleaning process is performed for 2 minutes by introducing hydrogen at 338 Pa·l/sec, and then generating a plasma by setting the pressure to 20 Pa and the high frequency power to 0.2 W/cm². Alternatively, hydrogen may be introduced at 169 Pa·l/sec, oxygen at 169 Pa·l/sec, and a plasma may similarly be generated at a pressure of 40 Pa. The substrate temperature is set from 300 to 500°C, preferably at 400°C. By performing the plasma cleaning process on the surfaces of the island-like semiconductor layers 204, and 210 to 212 at this stage, contaminating matter such as adsorbed boron or phosphorus, or organic matter, can be removed. Also, hydrogen is adsorbed on the surface by the plasma cleaning, making it inactive. Furthermore, by introducing oxygen and N₂O at the same time, the topmost surface of the deposition surface, and its close vicinity, are oxidized, resulting in desirable actions such as a